Solar UV radiation is a major provider of vitamin D for humans. This study examines distribution of solar UV radiation weighted according to the vitamin D action spectrum over North America. Brewer spectrophotometer measurements at 12 sites in Canada and 21 sites in the USA were used to calculate hourly and daily values of spectrally integrated UV irradiance using the vitamin D action spectrum. The same characteristics were also estimated using a statistical relationship between UV irradiance and global solar irradiance, total ozone, and dew point temperature for 45 sites in Canada and 52 in the USA. Different characteristics of the vitamin D action spectrum-weighted UV irradiance distribution over North America are presented in the form of monthly maps. The time required to obtain standard vitamin D dose is also calculated for six types of skin. Brewer measurements were also used to analyze the ratio between erythemal and vitamin D action spectrum-weighted UV irradiance. A simple formula that calculates vitamin D action spectrum weighted UV from UV Index is developed. An empirical formula that expresses the ratio of vitamin D action spectrum weighted UV to erythemal UV as a function of the solar zenith angle and column ozone is also suggested. Similarities and differences in geographical distribution of erythemal and vitamin D action spectrum-weighted UV irradiance over the US and Canada are discussed.